Abstract

Recently, the financial world witnessed a series of major defaults by several institutions and investment banks. Therefore, it is not at all surprising that credit risk analysis have turned out to be one of the most important aspect among the finance community. As credit derivatives are long term instruments, it is affected by the changes in the market conditions. Thus, it is appropriate to take into consideration the effects of the market economy. This thesis addresses some of the important issues in credit risk analysis in a regime switching market. The main contribution in this thesis are the followings :

(1) We determine the price of defaultable bonds in a regime switching market for structural models with European type payoff. We use the method of quadratic hedging and minimal martingale measure to determine the defaultable bond prices. We also obtain hedging strategies and the corresponding residual risks in these models. The defaultable bond prices are obtained as solution to a system of PDEs (partial differential equations) with appropriate terminal and boundary conditions. We show the existence and uniqueness of the system of PDEs on an appropriate domain.

(2) We carry out a similar analysis in a regime switching market for the reduced form models. We extend some of the existing models in the literature for correlated default timings. We price single-name and multi-name credit derivatives using our regime switching models. The prices are obtained as solution to a system of ODEs (ordinary differential equations) with appropriate terminal conditions.

(3) The price of the credit derivatives in our regime switching models are obtained as solutions to a system of ODEs/PDEs subject to appropriate terminal and boundary conditions. We solve these ODEs/PDEs numerically and compare the relative behavior of the credit derivative prices with and without regime switching. We observe higher spread in our regime switching models. This resolves the low spread discrepancy that were prevalent in the classical structural models. We show further applications of our model by capturing important phenomena that arises frequently in the financial market. For instance, we model the business cycle, tight liquidity situations and the effects of firm restructuring. We indicate how our models may be extended to price various other credit derivatives.